Bath stone quarry railways 1795 | 1830

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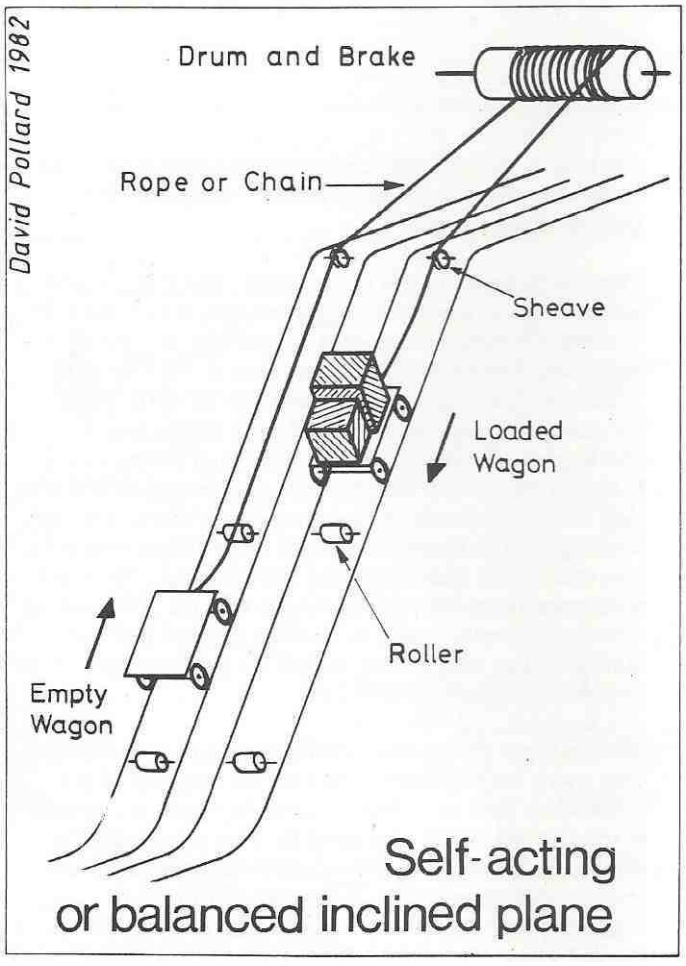
Introduction

There were three quite separate and distinct phases in the development of Bath stone quarry railways, the first being represented by Ralph Allen's early wooden lines on Hampton Down and the Combe Down *carriage way* of 1731-64

The second phase which is the subject of this article spans the years from 1795 - 1830. Nationally this was a period of rapid railway evolution, a situation which was reproduced locally. The five quarry railways used no less than four different types of track to achieve the common purpose of delivering stone to canal-side wharves. All had to overcome very steep gradients which fortunately favoured loaded wagons and the method used in four instances was the self-acting or balanced inclined plane (see sketch).



Bath stone railways made after the 1830s belong to the third phase of development, and were characterised by a uniform track gauge of 2 ft 5½ ins, wrought~iron and steel rails and by standardised rolling stock. These true narrow gauge railways were used both for internal quarry transport as well as carrying stone to the Great Western Railway.

Conkwell

From fragmentary references in the Kennet and Avon Canal records it is apparent that the canal company decided by the autumn of 1799 to open a quarry at Conkwell in Winsley parish. Stone was being supplied from this quarry during September 1800 and the *inclined plane* was first mentioned on the 3 October 1800. It is probable that the railway opened in September, for in October James Mcllquham was paid an allowance of £210 for 'Iron Rails, Rope &c at Dundas Aqueduct' and one Jackson received £37.7.0 [£37.35] 'for Timber for railroad'.'

By the summer of 1802 the railway must have been in an unsatisfactory condition, as numerous payments for repairs are recorded:-

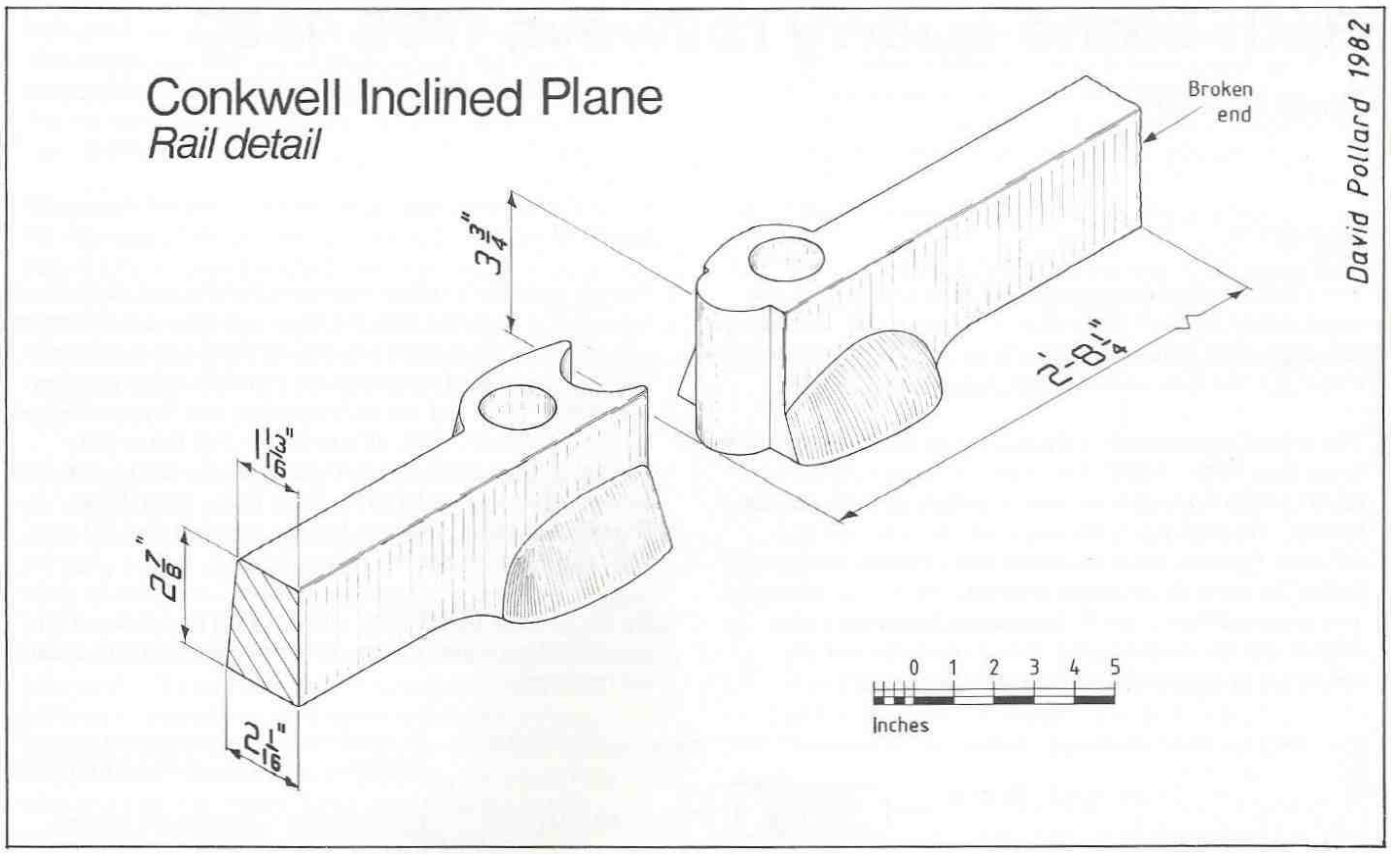
1802 May 21st	To Wm Deverell - repairing and relaying the railroad... £ 50.14.10 [£50.74]
1802 May 21st	To Thos Evans - repairing and relaying Railroad... £195. 0. 0
1802 July 1st	A new Rope . . .for the use of the inclined plane at Conkwell quarry. . . £ 87.15, 6 [£87.77] (supplied by Mr Ford of Beckington)
1802 Aug 13th	pd Thos Evans in full for framing 4 Waggons . .. £ 26. 0. 0
1802 Sept 10th	pd Thos Powell & Jn Lowe for carpenters work on railroad Conquil Quarry £ 7.19. 4½ £7.96 [2]

Nattes described the railway in his book on Bath published in 1806[3]; it probably continued in use until shortly before November 1812, when 'the wood sleepers, Rope &c belonging to Conkwell Quarry' were sold to Patrick Byrne for £175.0.0 [4]

The inclined plane which was of double track began at a wharf at the east end of Dundas Aqueduct (ST 786.625). Its route can be easily followed rising steeply up the valley side, mainly in a shallow cutting, still lined in places with dry-stone walling.

Some recently-discovered broken rails are of the cast-iron bar type with interlocking ends (see drawing), which would have been spiked directly to wooden sleepers. Rails of this type were first used by Thomas Dadford Junior on the Beaufort and Blaenavon line of 1792-93 [5]. Several colliery railways to the north of Paulton basin also used similar rails, but laid on stone sleeper blocks.

The incline top (ST 790 624) lies about 325 ft above the canal and 545 yards from it and immediately to the east of it is the large open quarry. Unfortunately the working faces have been obscured by tipping and it is impossible to know if there were underground headings. In addition to freestone



this quarry would have supplied large amounts of rag or rubble stone.

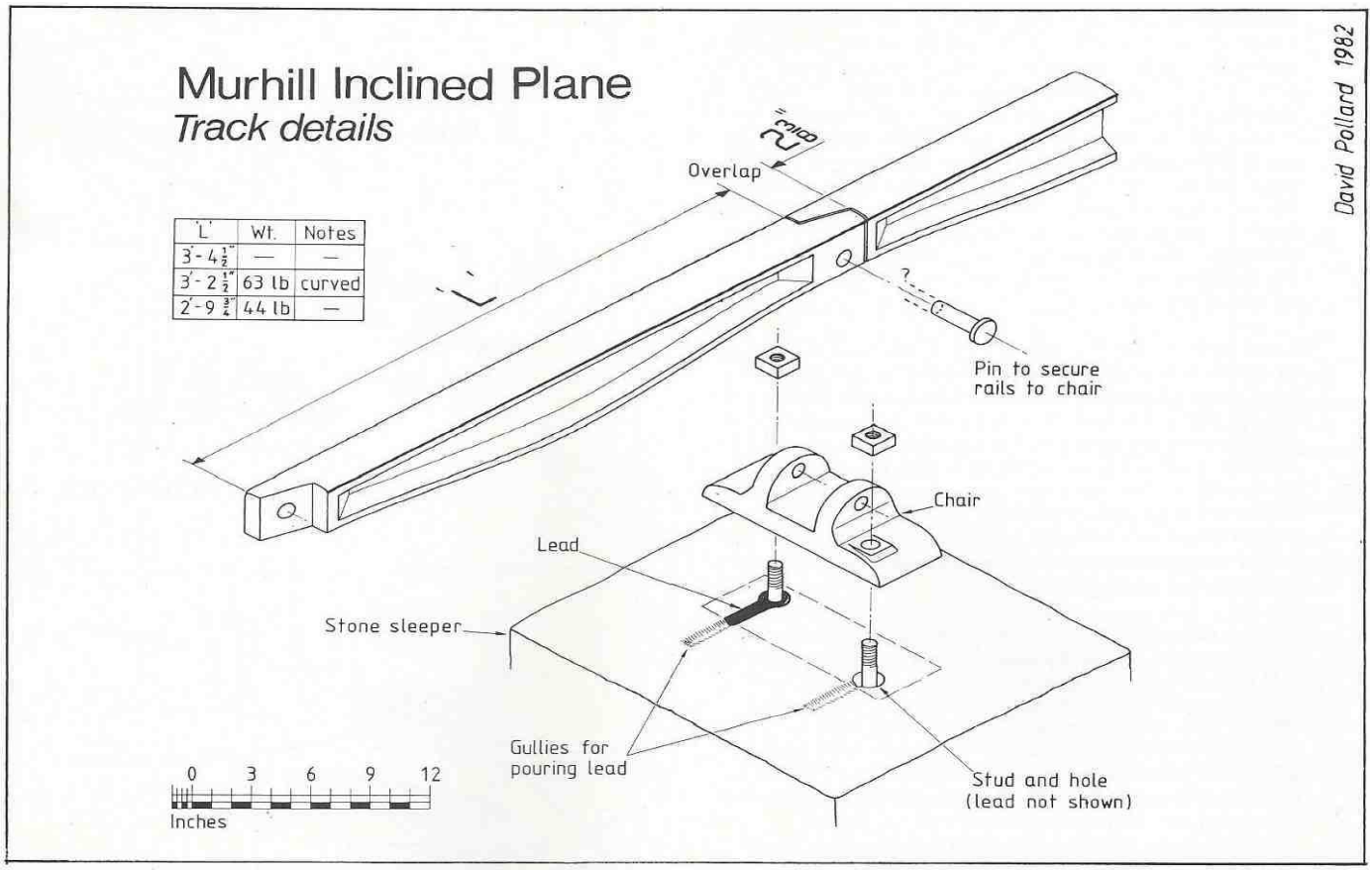
Murhill

On the 1st April 1803 the Canal Western Sub-Committee placed a contract 'for a wooden railroad for the new stone quarry at Murhill to be laid from thence to the canal' An agreement was made with Edward Edge and Thomas Evans to find the timber and lay the railroad, for which they received payments totalling £350 at various dates between October 1803 and May 1804 [6]. No further mention of the wooden railway has been found. Both quarry and wharf were occupied by Ambrose and John Heal, from 1811 until 1825, who supplied stone to Devizes New Gaol (1811 - 1814)[7],also to Bath and London[8]

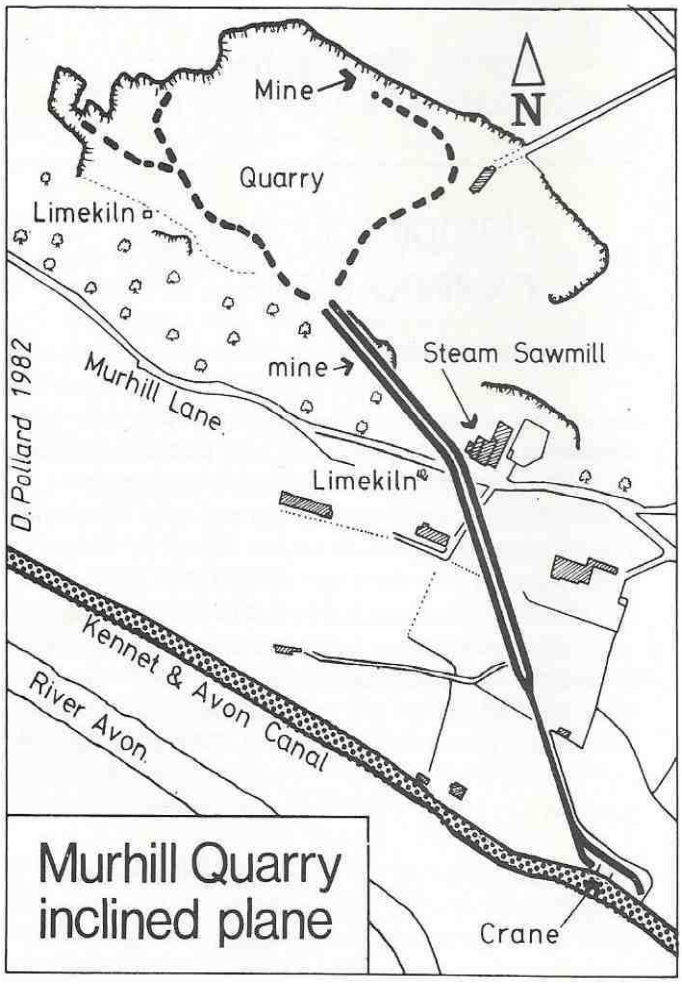
From September 1825, Messrs Dunkin and Baber leased the wharf and began to work the quarry. However, Dunkin complained to the Canal Sub-Committee that he had no right of way to the wharf, although the road crossed land in his possession[9]. Meanwhile, because of the fear of land-slips into the canal, the management committee opposed the working of the quarry until an engineer of eminence could be consulted. Mr Jessop, the engineer, reported by December 1825 that there would be no danger to the canal if the line of the projected road was varied to pass through land belonging to James Byfield, and the accumulation of rubble prevented. Byfield's land was bought in 1826 and a new road [railway?] laid down[10]. A steam engine and machinery to cut and work the stone to 'any dimensions' was installed in 1835[11]. James Baber occupied the quarry and railway until 1857[12] . In 1858 James Taylor was the tenant[13]. The quarry closed and re-opened at least twice between 1863 and 1874[14] but was long derelict by 1893, when a visitor noted 'very old-fashioned rails on an inclined plane running from the quarries down the hill'[15]

These rails remain in situ on the wharf, albeit buried and scheduled as an ancient monument. They are of cast iron 'I' section, fish-belly type, that is, with the rail deeper at mid-span. Fish-bellied rails were in use at Newcastle by 1798, the 'I' section feature dates from 1813-15, when the Jessops introduced it on the Belvoir Castle line [16] . The Murhill rails also conform to Losh and Stephenson's Patent of 1816 [17], in that the ends of adjoining rails overlap each other and are pin-jointed through the supporting cast-iron chairs. The chairs are fixed to stone sleeper blocks by iron studs set in lead-filled holes (see drawing). The track gauge now varies between 48 ins and 49¾ ins. Birkenshaw wrought-iron rails rapidly superseded those of cast-iron during the late 1820s, thus Murhill is a good example of the final phase of cast-iron railway.

The track can be followed, leaving the wharf (ST 706607) over a very worn turnout onto a curved length of single track. From here up to Murhill Lane the route, still known as the 'Trolley Road', is covered by a tarmacadam surface. Beyond the lane, in the grounds of Winsley Hospital, is a short level section and a slight change of direction suggesting that the railway had two separate inclined planes. The stone sawmill, steam engine and a limekiln were located at this point, and coal was brought up the incline for these. Stone sleeper blocks are still visible on the upper incline to the edge of the quarry (ST 794 608), almost 300 ft above the canal and about 330 yards from it[18]. The floor of the quarry is now occupied by Winsley Hospital.



'L'	Wt.	Notes
3'-4½"	—	—
3'-2½"	63 lb	curved
2'-9¾"	44 lb	—



Hampton Down

The *Bath Chronicle* of 23 June 1808 advertised for 'Any Person or Persons willing to contract to make an inclined Plane road from Bathampton Quarries to the Kennet and Avon Canal . . . are desired to send their proposals (sealed up) to Mr Bennett, engineer, St James Parade, Bath'.

In March 1809 the Canal Western Sub-Committee objected to the site of the proposed wharf, and notice was given to the Bathampton Stone Company to desist from making the wharf in the said situation [19]. However, the Bath Guide of 1810 - 1811 noted 'the immense quantities of stone conveyed by the inclined plane from the quarries of Messrs Bowsher & Co to the canal'.

In 1826 or 27 it was visited by two Prussian mining engineers, von Oeynhausen and von Dechen, who wrote:

> there is a self-actihg plane with a length of 2,658 feet to the Avon Canal upon which the stone is conveyed further. This plane has two divisions, the upper one, 1,658 ft long is not of uniform slope, it is very little near the top, up to 10 degrees in the middle, and at the bottom is both inclined and curved. The Lower division has a uniform inclination of about 5 degrees. The total perpendicular height is 480 ft to 500 ft. The whole length is traversed by a double cast-iron tramroad. Crossing switches are provided, serving both lines at the quarry, for each of the brake arrangements, and below at the canal. Each track has a gauge of 3ft 4in, and they lie the mine distance from one another.

The rails are 2½ feet long, 3½ in wide and 5/8 in thick. The flange is 2½ in high, & 7/l2 in wide at the bottom. On the underside close to the outer edge, is an arc-shaped strengthening rib l in high in the middle and tapering to nothing. The ends of the rails are ¾ in thick, and are provided with a small addition at the inner side. They have a notch whereby the rails two and two together, are fixed by an iron spike with a square pyramidal head. The rails rest on stone sleepers and the spikes are driven into wooden plugs therein. These rails are too weak for the load which is lowered upon them,which amounts to 80 cwt including the wagon. This is proved by the large heaps of broken rails that lie beside the line; nevertheless, the newly-delivered rails are cast no stronger.

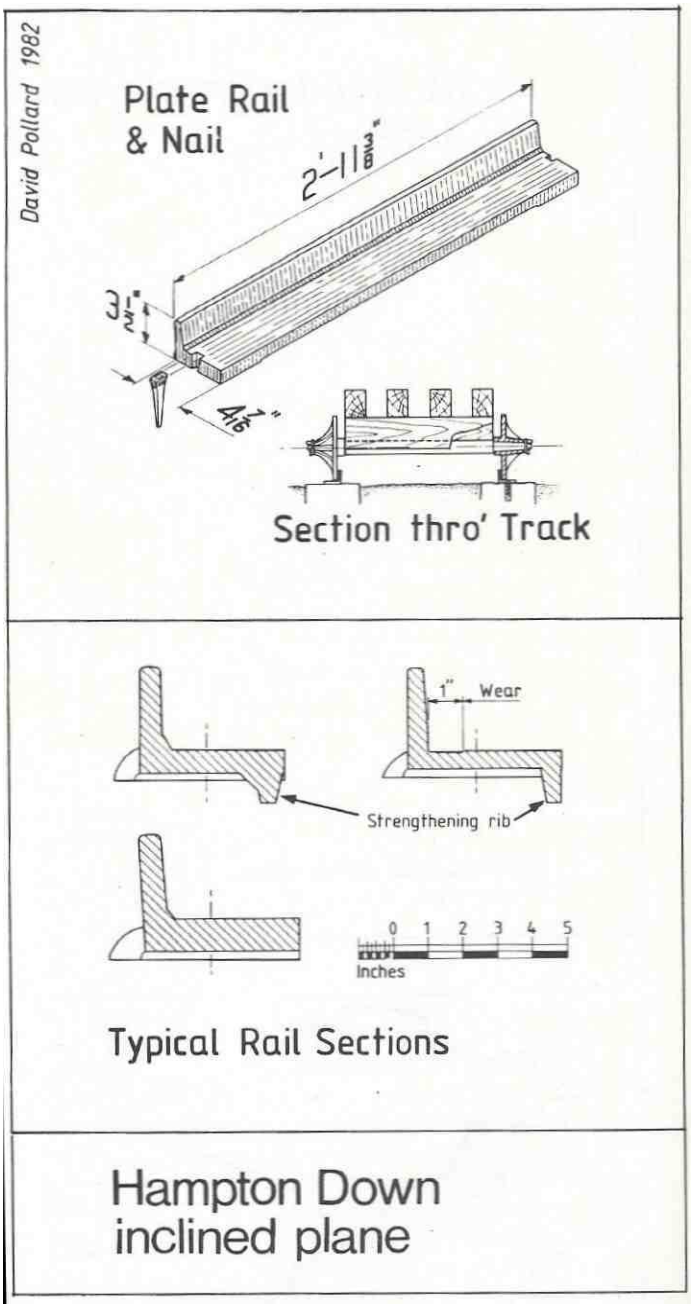
At the upper part of the line there is a conical rope drum on a horizontal axle, which is provided on one side, with a horizontal brake wheel the drum is 5 ft diameter at the ends and 6 ft in the middle, and is ll ft long. The rope by which the wagons on this part of the line are lowered is l¼ in diameter and untarred; it runs over wooden friction rollers 34 in long, 6 in diameter, with iron pivots The iron sockets in which these pivots turn are let into the stone sleepers on which the rails rest. As the rope drum is longer than the width of the railway, the highest friction roller is provided with flanges, and so arranged that it can slip to and fro on its axle.

On the lower part of the line, the brake arrangement consists of a rope sheave lying at the level of the rails on an upright shaft with a tilt of 6 in. This sheave is of cast-iron 8 in high, has a projecting rim on the outer side, and is 6 it 8 in diameter, so that the chain whereon the wagons are lowered lies directly in the middle of the track. This chain has straight links 4½ in long, 2¼ in wide, and is made of 5./8 in round iron. The brake wheel is on the same axle, under the rope sheave. It has a diameter of 9 ft and a height of 8 in and is surrounded for ¾ of the circumference by jointed wooden brake checks which can be drawn tight by a single fork connection.

This chain runs over cast-iron friction sheaves, erected 24 ft apart on separate stone sleepers in the middle of the track. These are 9 in diameter, are 7½ in long, have 1½ rims, and are fast keyed on wrought-iron axles 15 in long, which run in small cast-iron bearings.

The wagons on which up to 70 cwt of stone is loaded, consist of a wooden platform provided with an iron railing 2 ½ ft high. The platform is composed of four frame-beams 7½ ft long, 7 in high, and 5 in thick, bound together by tour cross-beams and some iron cramps. The axles are of cast-iron 3½ in high and 3¼ in wide. The round part of the axle in the nave of the wheel is 9¼ in long, l½ in diameter in front, and 2½ in behind. These axles are let 2 in deep into the cross-beams. which are 8 in square. The axle centres are 40 in apart. The wheels are 16½ in high, I in thick at the rim, with 6 spoke-like ribs between which holes are made. The length of the nave is 7¾ in. One such wagon with its wheels weighs l0 cwt. The narrow wheels probably contribute greatly to the number of broken rails.

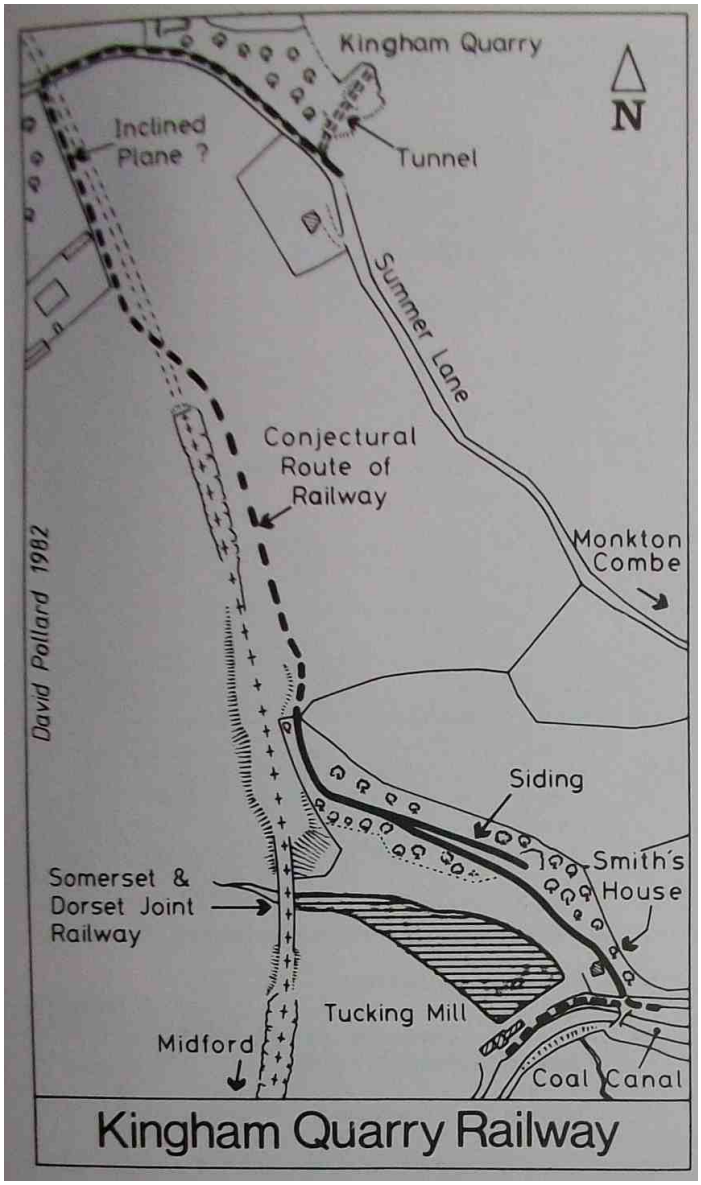
Of nine plate rails (or tram plates) and the fragment of a tenth known to exist, all but two are broken! There appears to have been four types of rail, the smallest (described above) is represented by the fragment. The other types (see drawing) each show a significant increase in size suggesting that attempts were made to cure the breakage problem, the fourth and largest type lacks the strengthening rib on some examples. Some recently discovered cast-iron friction sheaves are, with one small exception, exactly as described by von Oeynhausen and von Dechen. The plate rail was invented in 1776, 1778 or 1798 (the date is in dispute) [21]



and was not an evolutionary stage in the development of modern railways. They enjoyed a brief popularity in the early 19th century especially in South Wales and, at present, only one remains in use at a clay mine in Yorkshire [22] . The inclined plane which was derelict by 1847 [23] is now a public footpath from the wharf (ST 782 659) to the quarry (ST 777 654). The lower incline formerly crossed the I833 Black Dog Turnpike road (A36) by a stone bridge known as the *Dry Arch*, which was demolished in 1966. Above the road, the incline passes over a small bridge, and from here to the top, many stone sleeper blocks can be seen in situ.

Kingham

In 1798 William Smith, the 'Father of English Geology', bought a small estate at Tucking Mill by the Somerset Coal Canal in the Valley below Combe Down [24]. During 1809 or 1810, he conceived the idea of opening a Bath stone



quarry at Kingham Field, on the edge of Combe Down, and conveying the stone by a railway down,to Tucking Mill where it would be sawn by machinery and then loaded on to canal barges. Kingham Field was part of the Midford Castle estate of Charles Conolly.

Entries in Smith's: diaries [25] show that planning started in the summer of 1810 and was well advanced by the 26 January 1811. Then he agreed to sell Tucking Mill Meadows to Conolly for £1,330 presumably to finance the scheme. On the 9 April 1811, his diary records: 'agreed with Mr Conolly for O'Neal to begin his [Conol|y's] part of the Railway'. Exactly a month later he wrote to Conolly: 'Iron rails must be ordered'. An inclined plane was undoubtedly necessary for part of the descent to Tucking Mill, and on 16 May 1811 Smith was 'at Bath, writing on. . . Rollers &c'. On 26 May 1811 he signed a 'conveyance and agreement for a lease of the Land & Stone & Railway'

Smith saw John Thomas of the Kennet and Avon Canal on 9 June 1811 and 'agreed with him for 32 tons Rails for Mr C and 13 for myself at £8.7.0.' The canal Journal [26] records this transaction in more detail:-

Tons	Cwt	Qtr	Lbs		£ s d
13	0	0	6	Cast iron rails ' £8.7.0	108.11.5
2	1	3	16	Cast iron short rails ' £8.7.0	17.11.8
1	0	1	24	Cast iron turnouts	8.11.0
0	2	0	0	Nails 23/4	2. 6.8
					£137. 0.9

Laying of the rails was in progress during August 1811, when Smith spent several days at Tucking Mill. On the 15th he 'ordered better spikes to be used in laying the rails'; on the 17th he 'went to Railway and advised about the laying &c'; on the 18th 'Mr Wm Hill called and talked over the proposed sawing of stone by the power of my waterfall'. A 'second boatload of Iron Rails' arrived on the 23rd. On the 26th he sent the terms of a proposed co-partnership in stone manufacture to J Lowder Esq, Architect. Smith was still pursuing this matter in February 1812.

Smith ordered the saws for the stone manufactory in August 1812, and in late October was at Tucking Mill 'continuing improvements to the saw frames. 'Early in November, attention switched to the quarry where on the 6th he saw the 'quarry arch opened' This undoubtedly refers to the entrance tunnel into the quarry, thus the whole scheme probably came to fruition during November 1812.

ln April 1814, Smith mortgaged the remainder of his estate to Charles Conolly including Tucking Mill Wood, on which the 'upper side thereof was made a railroad communicating with the Railroad of . . . Charles Conolly and extending from thence to near the Coal Canal' [27]. This and the diary entries show that Conolly owned the upper part of the railway and leased it to Smith who owned the lower, or Tucking Mill, part.

Unfortunately Smith's imaginative scheme failed due to the unexpected deficiency of the stone [28] . When the quarry and railway ceased working is not known but, as late as May 1819, a Mr Frost visited him in London and talked 'of going down to Bath &c to see Tucking Mill and stone of a hard quality for paving'. A month later, on the 11 June, Conolly had Smith committed to the King's Bench Prison for debt and by 1820 Tucking Mill belonged to Conolly [29]. The lower part of the railway is clearly defined from Smith's house (ST 765 615) to just north of Tucking Mill viaduct (ST 764 617) a distance of about 350 yards, rising at a gradient of near 1:10. This length appears to have been of single track and not rope worked. Descending wagons were probably braked with sprags inserted between the spokes of the wheels. A few single-hole stone sleeper blocks can still be seen. These, together with a rail fragment and some nails show that plate

rails were used. A small quarry above the railway was linked to it by a short siding.

Beyond the viaduct there is no definite trace of the railway, but it is likely that the present footpath to Summer Lane follows it very closely.

Kingham is a small open quarry by Summer Lane (ST 765 621) which has been backfilled with quarry waste over a tunnel of railway proportions. This must be the 'quarry arch' Smith saw opened on 6 November 1812. The tunnel is made of unmortared scappled freestone blocks, and has fallen in about 30 ft from the entrance. It undoubtedly led to underground workings. Recent excavations showed that it once extended closer to the Lane.

Besides stone, the railway may have carried sand used for bread-oven floors, which Smith obtained from small tunnels driven into the hillside behind his house [30]. The partly collapsed entrance to one of these survives by the railway close to Smith's house.

Avoncliffe, Claverton and Prior Park

Other railways were contemplated but, apparently, not made. George Fletcher, an Engineer employed on the Kennet and Avon Canal, wrote in December 1794, 'I have found excellent stone for the purpose within 150 yards of Avoncliffe Aqueduct . . . which may be got down . . . by a small machine and railway'. [31]

On 31 March 1802 the canal Western Sub-Committee instructed James Mills 'to survey the ground from Claverton Down Quarry to the line of lockage [at Bath] for a Rail Road and make a Report thereon'. [32]

The Bath Guide for the years 1810 to 1816 says of Prior Park 'Messrs Thomas and Clutterbuck have commenced a spirited speculation in quarrying stone on the estate for the purpose of supplying this City, and the Ports of Bristol, London with the fine Bath Stone, by means of a proposed railroad (without the aid of horses) intended to lead to the basin of the canal at Widcombe'. Clearly this is a reference to an inclined plane.

Acknowledgements

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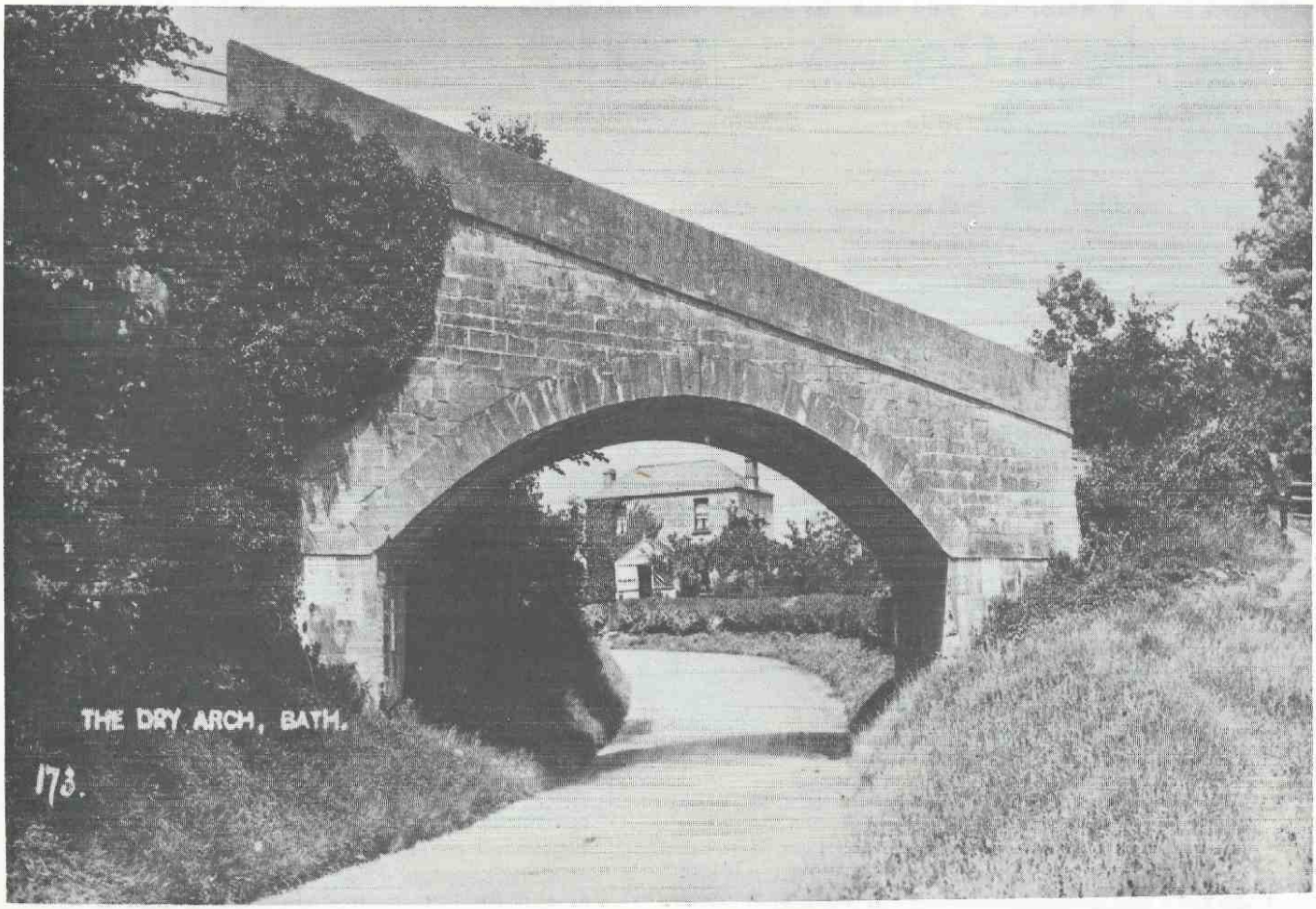

The Dry Arch, built to take the Hampton Down incline across the A36. The bridge was demolished in 1966.